

## **Syllabus – 001-2-5005 – 3 credits**

### Laboratory Methods for Environmental Studies

**Title:** Lab Course in Water quality for environmental studies: Major chemical and biological analyses and principals (Intensive)

**Prerequisite:** science / chemistry / engineering/ background or a like.

#### **Theory part:**

**1<sup>st</sup> day:** devoted to safety requirements and introduction 0830 -1530

Laboratory safety including labs visit for the identification of the safety components.

Review of analytical chemistry

Reliability of measurements

Accuracy and precision

Quality control

Chemical principles:

Formulas, Oxidation numbers, chemical reactions and equilibriums, Acids and Bases, Buffers, Solubility product.

Volumetric analysis, standard solutions and standardization

Colorimetry, Spectrophotometry and Chromatography

#### **2<sup>nd</sup> day:**

##### **Field trip, water sampling**

Morning: Field trip to a wastewater treatment plant and/or water reservoir (e.g. Yerucham WWT plant and Lake Yerucham), learning about appropriate water sampling and preservation. The students will analyze the water samples that were taken in the field trip

Afternoon: lab and reagents preparation.

#### **3<sup>rd</sup> – 8<sup>th</sup> days :**

Students are required to read the relevant techniques for the day and to take a quiz.

Following the quiz, 1-3 h lecture is given as a theoretical background for the method principles to be practiced.

Followed is hands on practice of the laboratory techniques (see list below). Class divided to 2 (max 3) person groups.

#### **Water analyses:**

- Acidity and Alkalinity (Titration)
- Ammonia, Total phosphorus and Total nitrogen (Spectrophotometry)
- COD (Back titration), BOD and Primary productivity
- Solids (Gravimetric analysis), Conductivity and pH (Electronic meters)

- HPLC (Chromatography) – demonstration
- ICP, and Dionix
- TOC/TN analyzer
- GC (Chromatography)
- Bacterial analysis (Feecal coliforms, and standard plate count)
- Molecular biology : DNA extraction, qPCR

**Grading:**

Participation: compulsory – 5%

Quizzes: 15%

Final report 80%